SUPPLEMENT.

The Mining Journal,

RAILWAY AND COMMERCIAL GAZETTE:

FORMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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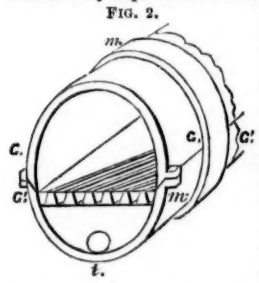
NEW TUBULAR LIQUATION FURNACE.

SIR,—Liquation, or eliquation,* is the term applied to the well-known metallurgical process, which consist in the separation, or "sweating out," of easier-fusible ores or metals, or alloys, from less fusible minerals (matrix), metals, or alloys, by exposing the ore or metallic compound, which contains components of different degress of fusibility, to such a degree of heat that the more fusible components are liquified, and, following the law of gravitation, run or drain off to a lower level, leaving behind, however, a residue composed not only of the non or semi-fused portions of the charge, more or less in their original state of rigidity, but, generally, also a larger or smaller percentage of the *fused* metal or ore, a circumstance which is partly owing to mechanical obstacles opposing the draining off of the liquid, partly also owing to what might be termed the latter's tendency to *adhere* to portions of the non-fused mineral or metal.

The separation (by means of a properly-regulated high temperature) of *native sulphur* from its (mostly calcareous) matrix; next, the separation of bismuth or antimony, or their easily-fusible ores, from their (mostly quartzose or spathose, what the Cornish miner would call "sparry") matrix; and, lastly, the draining off of lead or bismuth, &c., from copper or other less fusible metals or metallic alloys, may be considered as the most familiar instances of liquation and eliquation. I defer to a future occasion the description of a mode of liquation where, in addition to heat, *mechanical pressure* is employed, the which combined process of liquation would enable it to be compared with, and illustrated by, the still more familiar examples of the mechanical separation of the honey from the wax, or the "whey" from the coagulated casein, or "curd." Obviously, the combination of compression with the necessary degree of heat would chiefly be applicable to *soft* ores, and to metallic alloys—alloys whose liquation is now still mostly effected on "liquation-benches," or hearths, on which the alloy, cast in the form of *discs*, is ranged, charcoal being placed between and around the discs, the burning charcoal melting the lead, and causing it to drain off, leaving behind the unmelted copper, with which metal the lead had been cunningly caused to form a mere temporary ("promoters-company-kind" of) alliance, for the purpose of abstracting the *silver* therefrom.

For the liquation of bismuthic or antimonial ores, closed vessels, of clay or cast-iron, in the shape of cylinders or tubes, are considered the best. On a small scale, the process of liquation may be effected by means of two crucibles, a larger one being placed above another smaller but deeper one; the bottom of the upper crucible (which contains the ore), being perforated with holes, and its top closed with a lid, after the ore has been introduced, while the lower crucible is placed under the level of the heat-space, or is surrounded with non-conductors of heat (say, ashes). On applying the necessary degree of heat to the upper crucible, the more fusible part of its charge would drain off and pass through the perforated bottom into the cooler lower crucible, leaving behind, in the upper crucible, the non-fused part of the ore. The liquation in tubes on a larger scale is generally carried on as follows:—A larger or smaller number (according to requirements) of cast-iron tubes, generally of an oval or eliptical cross section, from 4 to 6 feet or more long, and 12 to 16 or 18 inches in the largest (vertical), and 6 to 9 inches in their smallest (horizontal) diameter, are ranged alongside and respectively above each other, in an inclined position, in such a manner that both the upper and lower ends of each tube protrude a little beyond the brickwork which forms the corresponding parts of the furnace. The fire-grate, flame-space, and flues of the furnace should be so disposed that every part of each tube is fully exposed to the action of the heat which is produced by the burning fuel. The tubes hitherto in use are closed at their lower ends, with the exception of a small hole or "tap," through which the bismuth or other liquified product runs off. The *ore* to be liquated is fed or charged into each tube through its higher end, 25 to 30 minutes being considered sufficient for liquating ordinary charges; and then, when the ore is considered to have been sufficiently "liquated," the "dörrner" (English, "drylings")—in other words, the *residue*, or *non-fused portions* of the charge—are withdrawn, by means of proper tools, through the same upper opening of the tube through which the ore had previously been introduced. The residue thus extracted is generally allowed to fall into a (at the bottom perforated) trough, which stands in another trough, containing water or a chemical liquid (the composition of the liquid depending on the composition of the ore that is to be treated), and after that a fresh charge of ore is introduced into the tube.

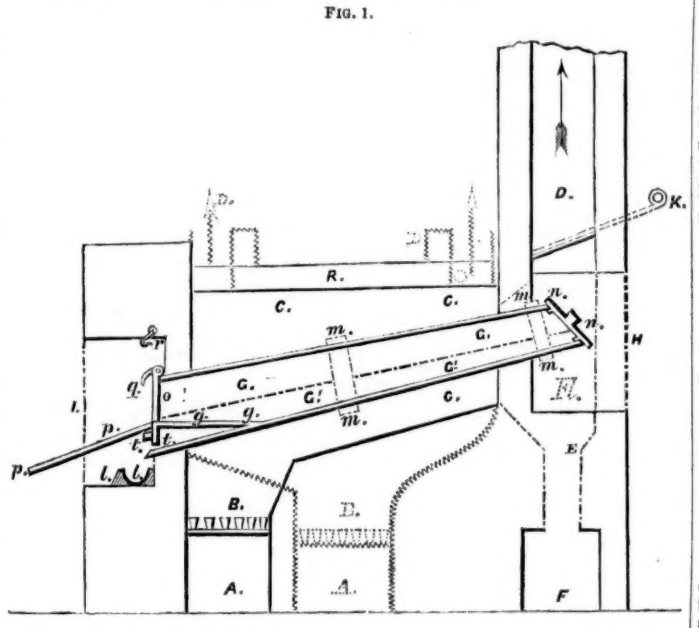
FIG. 2.



It will not be difficult to perceive that the above-indicated mode of working the said furnaces involves, in the first place, a greater amount of manual labour; second, absorbs more time; third, causes more wear and tear of tools and tubes; and, fourth, causes also a considerable amount of *waste of furnace heat*. The first drawbacks (one, two, and three) are chiefly owing to the fact that the "drylings," or residue, has to be drawn up an incline in order to be withdrawn. The portions of the ore which are at the lower extremity of the tube having to be scraped or pulled up through the whole length of the tube, and the difference between the force or amount of labour necessary for drawing up an incline any heavy body, and the slight exertion necessary for pushing the same *downwards* on an incline, is too well known to need further remark, the amount of wear and tear of tubes and tools being obviously in a corresponding proportion to the amount of labour; and, lastly, as regards the fourth drawback of the existing system, we must consider the space of time during which the respective tubes are *uselessly* exposed to the action of the furnace heat* while the residue is being extracted, and the fresh ore is being introduced.

Guided by the desire of doing away with the above alluded to drawbacks, I have designed a tube-furnace of a, in some respects, different construction, chiefly as regards the tubes, a vertical section from the ore-charging to the residue-discharging end of which furnace is indicated by the accompanying diagram, Fig. 1. It is to be understood that the diagram only represents the relative position of *one* of the tubes, there being, of course, a greater or less number of tubes arranged alongside of and above each other in *one* furnace, the tubes forming the upper row being generally of smaller diameter; possibly, however, in the improved furnace tubes of smaller diameter might conveniently be dispensed with altogether. In the diagram, Fig. 1, *A* is the ash-pit; *B*, the fire-grate; *C*, the flame space around the tubes; *D*, the chimney into which all the flues (*F*?) enter; *E*, a vertical canal for each flue, through which any soot or dust is carried into the pit, *F*; *K*, iron damper, one for each flue, to regulate temperature; *G* is the upper, and *G*[1] the lower portion of liquation tube (if it be desirable to have them made in two halves, for the purpose of saving material), held together chiefly by the rings or hoops, *m m*, and, besides, having their joints well *luted; H*, end of the furnace, where the ore is fed or charged into the tube, by removing the lid, *n*; *I* is the end of the furnace, where the still non-fused residue is withdrawn, after having slowly been turned over and over while passing over the grate *g g*, which is contrived inside each of the tubes†, the residue after issuing from the tube falls over the inclined iron plate, *p p*, into the above alluded to receptacle. *R* is the roof of the furnace, *x x* indicate the masonwork or brickwork, *t t* is the tap, or opening through which the liquid metals runs off, falling into an iron gutter or launder, whose cross-section is indicated by *l l*, and through which the liquid metal passes into the larger receiver, for which purpose the said conduit should have an *inclined* position; *o* is the lower lid of the tube, with (if it is *hinged*) the arrangement, *q* and *r*, for keeping it open while the residue is being withdrawn. Fig. II shows section of the lower (residue discharge) end of a tube, marked with the same letters for the same parts as explained in Fig. I. The *long* and short dotted lines (— · — · —) indicate sectional lines of flues, &c., either to one or other side of the sectional plane, which is indicated by the full lines; the *serrated* lines (~~~~~~~~~~) indicate the internal shape of the same furnace if *wood fuel* is used.

FIG. 1.



From a glance at the accompanying diagram, it will be perceived that the tubes are of larger diameter at their lower discharge than at their upper intake end,—an arrangement which was necessitated by the introduction of the grate, *g g*, in order to thus afford sufficient space above the said grate for the mechanical operations connected with the working of the furnace, and also by considerations of the conditions of temperature.

The time and mode of operation for charging and discharging the tubes depends, of course, on local circumstances, and on the nature of the ore; but generally, and chiefly in the case of easily *liquatable* ores, the more furnace-heat-saving process would be to introduce the raw ore at the top end of each tube gradually, in small charges, whose cubical contents should be so arranged as to correspond with the quantum of residue that is being withdrawn at the lower end of each tube, thus causing the liquation to be continuous, while at the same time the fullest effect of the furnace heat is usefully employed.

As already stated, there are generally a number of tubes, ranged alongside and above each other in each furnace or oven; in the case of what we might almost call a semi-reverberatory furnace, whose sectional outlines in the diagram are indicated by the *full* lines, there should be flues not only in each space between the top ends of the tubes, but also a (slightly larger) flue on the outer sides of both the right and left last tube. I have taken the liberty of attempting to incorporate the outlines of two kinds of furnaces in one diagram—the *serrated* lines showing the sectional outlines of a furnace intended for wood fuel, an arrangement which I understand is novel, but I trust excusable, especially as the reader who is acquainted with the subject is not likely to be misled thereby. As regards *fuel*, there may of course, be employed, besides coal or wood, peat, or waste heat, or waste gases from other higher temperature furnaces, for either of which heating agents the shape of furnace will have to be specially adapted; the shape of the tube, however, would remain essentially the same as shown in the diagram, as would also the *modus operandi* for working the furnace. For antimonial ores the tubes might be arranged at a steeper, higher angle, in triangular or semi-circular ovens, the opening for charging the *fuel* being at the apex, the horizontal section of grate being either triangular or horseshoe shaped, the residue from all the tubes falling on a central grate, on which they are drawn out at the end opposite the furnace door, the liquated ore or metal falling into a reservoir *below* the said grate, while the raw ore is fed into the top end of each tube, thus ensuring the same advantages as indicated in the furnace already described.

GUSTAV J. GUNTHER.

* For a nice distinction, the former term may be applied to the treatment of *ores*; the latter to *metallic alloys*.

* The same consumption of fuel is going on, even in furnaces where by a proper regulation of *flues* the heat could be diverted from such tubes as are being discharged and re-charged, an undue cooling of the tubes in that latter case being another drawback.

† The diameter of the holes, or the distance between the bars, of this grating must be regulated by the size of the particles of ore composing the charge.

NOTES ON COLLIERIES IN SOUTH WALES—No. II.

THE SOUTH-EASTERN DISTRICT.

MORFA COLLIERY.—Leased by Mr. H. H. VIVIAN, from Mr. TALBOT. There is one downcast and drawing pit 170 yards deep, and one furnace pit 240 yards deep. The Cribbwr and 9-feet seams are worked, about 500 tons per day, by one winding-engine; a pumping-engine is erected, but not in use, as there is no water. The coal is got principally from the dip by hauling-engines, placed underground; dip of measures to north 18 inches per yard, or 1 in 2. Another sinking is proposed northward, to obtain this dip coal. The coal is bituminous and friable, and produces more than one-half of small in screening. The small is all utilised at the copper works, coke ovens, and other works adjoining; there are six large screens in operation. There are 62 coke ovens built in one double row, 14 feet long, 6 feet wide in front, 5½ feet at back, loaded at once on the top by hopper wagons, holding each 3½ tons of coal, for which a roadway, on brick pillars and beams, is specially constructed. The coke is drawn by four fixed crabs and appliance, as follows:—A groove is formed in the bottom of each oven, covered before charging with fire-bricks; when the coke is to be drawn an iron hooked bar, 1¼ inch square, is thrust into the groove, which takes hold of a cross bar previously fixed at the back of the oven for the purpose; the whole mass is thus drawn out. Most of the coal from this colliery is shipped at Port Talbot for Cornwall, by means of hopper wagons, resembling those used on the Tyne and Wear.

PYLE COLLIERY.—Mr. TALBOT'S royalty, who also works the colliery. The Cribbwr, 9-feet, and 5-feet seams are worked. Drawing-pit 70 yards deep. Coal all raised by an incline or "slip," commencing 160 yards from the bottom of this pit, extending to the dip 600 yards in the 5-feet seam; inclination, 1 in 2. The coal is raised from the slip by an engine placed near the top, working an endless chain 1¼ inch thick. The small coal is utilised for coking. The Cribbwr coal makes superior and pure coke, without washing; the other coals are washed by machinery previous to being coked. The ovens are partly oblong, coke drawn by crabs, and partly round ones, drawn by hand; ovens charged at doors; a small chimney to each. One upcast pit, at which a ventilator (STRUVE'S) is in operation, having two 18-feet airometers. Another upcast, on which a fan (WADDELL'S) is erected, small vertical engine, direct acting, makes 90 revolutions per minute. Diameter of fan 19 feet, has curved and tapered vanes; these are 15 inches broad at the circumference. This, and the adjoining collieries of Cefn, also belonging to Mr. TALBOT, are near to and in connection with the South Wales Railway.

TONDU COLLIERY, leased by Messrs. BROGDEN from the Countess of DUNRAVEN and Mrs. NICHOLL. The Cribbwr and 5-feet seams are worked by a "slip," driven down about 500 yards in the 5-feet seam; dip, 1 in 2. The section of minerals at Tondu shows two seams of coal in the Bettws series, below these the Pennant rocks, containing seven seams of coal, none of which prove of workable quality; and the lower series, from the Small vein to the Cribbwr-fach, containing 20 beds of coal and several beds of ironstone, as under:—

	Thickness of strata.	Thickness of coal of 3-ft. seams and upwards.
Bettws series—two seams of coal.....	53 yds.....	10 ft. 9 in..... 2 seams
Pennant rocks—seven seams of coal ..	470	15 9 .... 4 ,,
Lower series, shale, a few beds of rock, ironstone, and twenty beds of coal to Cribbwr-fach	247	81 9 .... 14 ,,
Rock and shale to millstone grit, with ironstone	85	— .... —
Total	855	108 3

Drawing-engine at slip, two 25-inch horizontal-cylinders, 5 ft. stroke, 40 lbs. steam pressure, 10½-ft. drum, 1½-in. wire-rope, draws in four minutes 10 tubs=4 tons of coal up the slip. The coal is got by pillar and stall in these seams, the roof being usually weak, requiring timber largely; floors also soft, and swell up. The coal is worked on the same system at Morfa and Pyle, but the seams are thicker in that direction. These collieries are all worked with safety-lamps. The Cribbwr seam at Tondu is excellent house coal, and produces coke of superior quality; is effectually screened for these purposes. The water is pumped at Velin-vach Pits, where until lately coal was drawn; one pit 100 yards deep, another 150 yards deep. A pumping-engine is placed at the bottom of the latter pit, having two 26-in. horizontal cylinders, 2 ft. stroke, works direct to two 8-inch pumps, each double-acting, with a plunger. There are no rods, the water being forced up a 7-inch main pipe, 140 yards long from the pump to its delivery at the off-take drift; the pressure of water at the bottom of this column would be 182 lbs. per square inch. An engine (direct-acting) has been erected on the top of the pit 100 yards deep, which works a 12-in. lift 90 yards long; the engine at the bottom is only required now to force the water 50 yards up to the shallow pit's bottom. A water-wheel is also in operation to pump water from the upper springs. A large pumping-engine has lately been erected at the top of the slip, to follow down with pumps and rods as the slip is extended. Tondu fan (Nasmyth's), 17½ ft. diameter, 4 ft. wide, 8 arms, 16 vanes, 3½ ft. deep, central opening 7 ft. diameter, air in circulation 30,000 cubic feet per minute, with ·65-in. water-gauge, equal to a pressure of 3·38 lbs. per square foot=3-horse power. Engine vertical, direct-acting, 20 inch diameter, 2 ft. stroke, 56 revolutions per minute, 10 lbs. steam-pressure=21-horse power, equal to one-seventh, or 14 per cent., of the power utilised. No other collieries are yet opened to the eastward of Tondu for a long distance on the same measures, the coals being friable, and associated with weak strata,

so far as they have been proved, which has deterred any speculation in that quarter. Two blast-furnaces in operation at Tondu, about 50 ft. high, and extensive rolling-mills; the former utilise the small coal produced at the collieries after being coked, and the mills the rubble and inferior coal. A considerable quantity of large coal is shipped at Porth-Cawl Floating Harbour; this harbour, which has recently been improved and enlarged at great cost, consists of an outer half-tide basin of 1½ acre, and piers extending a long distance seaward, and an inner dock of 7½ acres, having an extensive wharf frontage, and coal tips of improved construction.

Llynvi Valley Railway, from Maesteg to Porth Cawl and Bridgend, broad and narrow gauge. The Llynvi Iron Company possess extensive colliery works to supply their blast-furnaces and rolling-mills with coke and coal; coal is also exported. A vast quantity of coal and ironstone has been worked in "patches" on the surface, and large quantities of debris are brought out of the levels, and tipped on the surface; these, with the iron slag tips, give to the hills and valleys of this locality a desolate appearance. There is not much of interest to record in connection with these collieries, excepting the Duffryn level; an engine has lately been built to haul in and out of this level, has two 22-in. horizontal cylinders, 3 ft. stroke, motion reduced as 2 to 1. Two drums for main and tail ropes. A ventilating fan (Waddell's), 22 ft. diameter, has just been erected, driven by a vertical cylinder, 22 in. diameter. Three screens and a self-acting incline have also lately been put in operation, by which the large trucks are brought up to the screens.

Ty-with Colliery, leased by Messrs. Brogden. The Victoria, Yard, and Cae-David seams got by level, about 300 tons per day, lowered by self-acting inclines to the Llynvi railway sidings. Long wall method of getting coal is preferred where it can be carried out; in other cases stall and pillar method is resorted to. An engine is erected near the mouth of the lower level, which hauls in and out by a main and tail rope; two drums, 6 ft. diameter; two horizontal cylinders, 15 in. diameter, 16-in. stroke; motion by spur-wheels reduced 3 to 1; length of main road plane, 1400 yards. The tail rope is used only on the main road, there are two short branches to the left and one to the right of the main road, the empty wagons are drawn into these branches by horses with the main rope; the latter pulls the wagons out, and the tail rope is attached where it was knocked off. A blowing-engine erected near this hauling-engine, 12-in. steam-cylinder, 10-in. air-cylinder, 3-ft. stroke; 1500 yards of 2½ and 2-in. gas-pipe carry compressed air to the coal cutters, which have been in operation in the Cae-David seam; they have been strengthened in their working parts, and otherwise improved, are made to work in places 25 yards wide; these coal-cutters are Donisthorpe and Co.'s patent. The roof is variable here, so that it is often difficult with a weak roof to keep the face open, and impossible to keep the cutters always in action under these circumstances. A force-pump, with 6-in. ram, is also actuated by compressed air from the same pipes; the water-pipes are 3 in. diameter.

Cwm-du Colliery.—Same firm. The Victoria seam, 3 ft. 2 in., and the yard seam, 3 ft. thick, are worked by two levels, about 200 tons per day; both produce good house coal, and blackband has been worked to a great extent. A hauling-engine, placed about 200 yards distance from the upper level, has two horizontal 16-inch cylinders, 2 ft. 10 in. stroke, 40 lbs. steam-pressure; boiler, 36 by 7 ft.; speed reduced from 4½ to 1. Two drums for the upper level, and two drums for the lower one. The upper level is worked by main and tail ropes; there is—1. An ascent of 1 in 18 from the engine to the level mouth. —2. A level plane inside.—3. A descent at the far end. The tail rope works the first and second lengths with the empty wagons; it is then knocked off, and the wagons run by gravity to the end of the third length with the main rope. The main rope pulls the full wagons out along the third length, where the tail rope is attached; the main ropes pull them along the level plane to the mouth, where it is knocked off, and the descent of the full wagons down the first plane is regulated by the tail rope and drum break. In the lower level the empty wagons run in by gravity, and full ones are drawn out by the main rope; the other drum is not required. The ventilation at Ty-with and Cwm-du is effected by small furnaces and chimneys placed on the surface; little fire-damp is produced. There are large and effective screens at each place for separating the large and small coal.

Garth Colliery.—Same firm. Two pits are sunk, 14 and 12 ft. in diameter, 140 yards deep to the Cae-David seam, which produces a good steam coal; depth, 60 yards to Victoria, 90 yards to yard seam. In sinking these pits a portable engine, with 6-inch set of pumps, raised water from the Victoria seam at the large pit; below this the water was raised by the winding-engine and tubs. The second pit was sunk altogether by a portable engine and tubs, raising both water and stones. The winding-engine erected at the 14-ft. pit is a single horizontal cylinder. The pumping engine, direct acting, placed on the same pit, works two sets of pumps, high set forcing 15 in. diameter, 90 yards long; lower set lifting 12 in. diameter, 50 yards long. The pit is fitted up with wood guides; two steel cages, with Owen's safety-catches, each raising one tram of coal.

Oakwood Colliery, near Garth, leased by Mr. Davis. The Cae-David seam is worked and raised through a slip; it produces good steam coal. A pair of pits are being sunk by the same owner to the lower coals; they have lately passed through the coal-tar vein at the depth of 90 yards, and in two months the 6-ft. seam may be reached. An engine with two horizontal cylinders is built, and coal working is intended to be carried out on an extensive scale.

Ogmore Valley.—A narrow gauge railway has been constructed up to the head of this valley, branching from the Llynvi Railway, at Tondu; its length is seven miles, and will develope the coal and ironstone—as yet scarcely touched—of Llangeinor and adjoining parishes. Llangeinor parish is 6710 acres in area; the minerals under the common of that parish belong to the Duchy of Lancaster; this, with some smaller plots, amounting to about 3240 acres, are leased to Messrs. Brogden and Sons, by whom extensive openings in Nos. 2 and 3 seams have been made, and a pair of pits at the upper end of the valley have lately been sunk through the 2 ft. 9 in. seam, which proves 4 ft. 10 in. in thickness, and of excellent quality. No. 2 seam, 3 ft. 7 in. thick, worked by level, being a tender coal, with weak roof, is worked by 7-yard stalls and 8-yard pillars, driven from wide cross-headings; the pillars are obtained as soon as the stalls are driven to their lengths, 60 yards. No. 3 seam, 2 ft. 9 in. average thickness, worked by level, rock top, usually worked by 22-yard stalls, 11-yard pillars, cross-headings, and level headings, 8 or 10 yards wide. The bottom was not cut in the stalls, only in the headings, owing to its hardness, being strong rock, in many places close under the coal. In some cases No. 3 seam was worked by long-wall, no pillars being left, the rock roof keeping up while the stalls were driven to their length, 60 yards. Both the seams furnish good house coal, produce no fire-damp, some black-damp, ventilated by furnaces underground.

The two pits, situated on the Dunraven property, are 15 ft. down-cast and 12 ft. upcast, 40 yards apart, 161 yards deep to the 2 ft. 9 in. seam. Each pit was sunk by means of a single 16-inch horizontal cylinder engine, 2 ft. 10 in. stroke, placed back to back between the pits; these engines drew all the stone and water by tubs, without the aid of pumps; two thick beds of hard rock were encountered, giving off large springs of water—one bed of rock, at 115 yards, with water, 12 gallons per minute in each pit; another bed of rock, at 140 yards, with water, from 30 to 55 gallons per minute in the large pit; this pit was in advance of the other; there was less influx of water in the 12-feet pit. The rock was of a hard crystalline structure, resembling the whin of the North. After firing shots, the influx of water was most abundant; no progress could be made with sinking for some time, until the springs abated to some extent. After passing through the rock, the springs have gradually diminished; they are conveyed into a lodge-room, from whence the water will be raised by pumps. The pits are walled throughout with common bricks and lias lime, 14 inches thick at the top, through the clay, and 9 inches below. The 2 ft. 9 in. seam proves in this sinking a good steam coal, and dips from 2 to 3 in. per yard north-east; it may be more bituminous than the Ton and Park coal, in the adjoining Rhondda Valley, three miles distant, but equally valuable for steam purposes. The seams below are as yet unproved, but will, no doubt, hereafter be worked to advantage. After passing Nant-dyris Farm, the measures commence dipping southward, considerably in some parts, so much so that the Bettws veins are supposed to have been worked in the levels driven at and opposite Pant-y-Nawel; if this be so, sinkings in that locality would have to pass through the Pennant rocks, and, probably, be encumbered with heavy springs of water, in order to reach the No. 2 and No. 3 seams, and steam coals below. But in the upper portion of the Ogmore, and also of the Garw Valley, the steam coals may be reached by sinkings of moderate depth: 88 coke-ovens are erected in connection with these collieries, for coking No. 3 coal, in one double row, 14 ft. long, 6 ft. wide in front, 5½ ft. at back, having a middle flue for conveying the gases to three large chimneys. The coke is drawn by cradles and two travelling crabs. Each oven makes 6 tons of coke per week: 30 cottages are built at Nant-Moel, and 52 at Ty-newydd, by Messrs. Brogden, for their workmen.

Aber Colliery, in the Ogmore Valley; leased by Messrs. Nicholson and Taylor, of 600 acres, from the trustees of the Swansea Grammar School. No. 2 seam is here worked.

The Glamorgan Coal Company have extensive royalties, taken in the Little Ogmore, and work the No. 2 seam by levels, and No. 3 seam by pits. Mr. Evans has levels in No. 2 seam, in the same locality, which is extensively worked.

Penrhiwfer Colliery.—Simon Davis and Co. No. 2 seam, 3 ft. 6 in., worked by levels, and No. 3 seam, 3 ft. thick, worked by pits.

Pen-y-Graig.—Rowland and Co. No. 2 seam worked, about 200 tons per day; 45 circular coke-ovens built; coke, the small from No. 2; a drift driving down for No. 3 seam. These four collieries are in connection with the Ely Valley Railway, a broad-gauge line, which joins the South Wales Railway at Llantrissant.

Several new lines of railway have been projected to facilitate the development of the minerals of this district. A line is intended to be made from Black Mill to join the Ely Valley Railway, giving the Ogmore Collieries a shorter route to Cardiff, by narrow gauge. A railway is projected from the Ogmore Line, near Tondu, to the Garw Valley. Another railway, from the head of the Rhondda Valley to Blaenavon, and thence by the South Wales Mineral Railway to the ports of Briton Ferry and Swansea.

ON THE GASES FOUND IN COAL MINES, AND THE PRINCIPLES OF VENTILATION.

Sir,—The various dangers associated with the working of coal in mines have been lately brought under notice in the *Mining Journal*, more particularly of that class arising from the explosion of fire-damp, and the means for preventing such occurrences have been repeatedly stated. It will, no doubt, have a salutary effect to show the conditions under which explosions occur, and set before practical persons, who are daily exercised in the details of colliery working, the nature of gases and the means employed in districts where the most approved arrangements and practical knowledge are in force to prevent such accidents. It is not so much, perhaps, that these arrangements are always unknown, as that there is a want of due care in carrying out the usual colliery regulations. We believe this to be the cause of the notoriety of British coal mines for the occurrence of explosions, more than from a want of knowledge of the nature of the dangers to contend against from the production and presence of fire-damp; at least, this will apply to later times. We, therefore, lay before those interested the following facts as to the nature of gases, and the caution and skill required in dealing with them. By obtaining comprehensive views on this and other subjects of mining, persons having the charge of collieries are assisted in coming to correct conclusions in doubtful and important cases, and they will, with greater facility, fix on a system that is applicable to a particular case.

We purpose giving further examples of colliery ventilation, in addition to those lately given in the Journal, in which were stated the quantities of air in circulation and powers of ventilation. We cannot state in what way these quantities of air are distributed in the recesses of the mine, not going into these details, but we will proceed to state that unless every passage in a mine is ventilated there arises, more or less, a vitiated atmosphere; this may be caused by carbonic acid gas, or light carburetted hydrogen, issuing from the pores of the coal, or a vitiated atmosphere may be caused by respiration and blasting with powder; the two latter are the causes inducing impure air in the copper mines of Cornwall, and which has the effect of shortening the lives of the miners. Carbonic acid prevails greatly in coal mines; its presence has a pernicious effect on the health of those breathing it. The two gases—carbonic acid and carburetted hydrogen, are sometimes, though not frequently, given off in the same place; the effect of the mixture is that carbonic acid destroys the explosive properties of carburetted hydrogen gas; the air is then only unfit for breathing. Nitrogen is probably found in considerable quantities in some mines from the decomposition of air, the oxygen combining with coaly matter, leaving free nitrogen. The most dangerous gas, however, is carburetted hydrogen when mixed with pure air in certain proportions, as hereafter stated:—

Pure air consists of—	By weight.	By volume.
Oxygen	23·32 per cent.	21 per cent.
Nitrogen	75·55 ,,	79 ,,
Carbonic acid	·10 ,,	— ,,
Watery vapour	1·03 ,,	— ,,

Carbonic acid varies in its proportion, and also watery vapour, evaporation being most abundant in hot and dry seasons. Watery vapour is 1400 times lighter than water; air is only 820 times lighter. In these seasons there is a deficiency in ventilation as compared to others when the air is cold, and not much saturated with moisture. The pressure of the atmosphere is 14·7 lbs. per square inch, when the mercurial column stands at 29·922 inches, and the column of water at 33·92 feet, the temperature being 32°. Air has been compressed into 1-128th of its usual volume. Air and gases are rendered lighter by the application of heat; air expands from 32° to 660°, at the rate of 1-480th for each degree: 480° would double its former volume, and render it specifically one-half lighter. This is the well-known means of obtaining the ventilating power in furnace pits, the power being according to the depth and increased heat given to the air in a given area—1-459th is sometimes given instead of 1-480th for the increase in volume for each degree—the result of experiments by different investigators. The velocity and pressure of air are shown in the following table:—

Velocity of wind. Miles p. hour.	Feet p. second.	Pressure per square foot in lbs.	Common appellations of its force.
1	1·47	·005	Hardly perceptible
2	2·93	·020	Just perceptible
3	4·40	·044	
4	5·87	·079	Gentle wind
5	7·33	·123	
10	14·67	·492	Brisk gale
15	22·00	1·107	
20	29·34	1·968	Very brisk gale
25	36·67	3·075	
30	44·01	4·429	High wind
35	51·34	6·027	
40	58·68	7·873	Very high wind
45	66·01	9·963	
50	73·35	12·300	A storm or tempest
60	88·02	17·715	A great storm
80	117·36	31·490	A hurricane

From this table it will be observed that when the velocity is doubled the pressure is four times greater; when the velocity is trebled the pressure is nine times greater. In the case of winds on the surface force is principally expended in creating velocity, the resistance arising from its friction with the surface, and objects on the earth, will absorb but a small portion of the force. In ventilating mines not only is there force required to occasion velocity; there are also the frictional resistances of the rough surfaces of the air passages, which absorb the greater portion of the power, and in an extensive mine will amount to as much as twenty times or more of the power required to produce velocity.

The power required to overcome frictional resistance in air-ways is as the area of the passages, compared with the amount of rubbing surface. The circular form offers less resistance than any other; next to that a square form. In two air-ways—one 10 ft. square, another 20 ft. by 5—the areas are equal, but the perimeter or rubbing surface is 40 ft. in the former case, and 50 ft. in the latter, requiring, with the same quantity of air, one-fourth more power for a 50-feet perimeter. It is better to have one large air-way than two small ones which together are of equal area with the large one. In an air-way 10 ft. square=100 lb. area, the rubbing surface is 40 ft. In two air-ways 7 ft. 1 in. square, the combined area is also 100 ft., but the rubbing surface is 56 ft. 8 in., or more than one-third greater, requiring a corresponding increase of force to produce the same quantity of air in the latter. And, comparing an air-way 10 ft. square with another 5 ft., it will be found the area of the latter is one-fourth that of 10 ft. square, but the rubbing surface of two 5-ft. passages would equal that of one 10-ft., and four of the 5-ft. passages would have twice the rubbing surface of one 10-ft. passage, thus requiring twice the force in the 5-ft. passages to circulate the same quantity of air through them as in one 10-ft. passage.

One cubic foot of air weighs ·080728 lbs., at 32° temperature and 14·7 lbs. pressure, and 100 cubic feet weighs 8·0728 lbs., so that from the specific gravity of the gases afterwards given their weight per cubic foot can be ascertained. Light carburetted hydrogen, or fire-damp, specific gravity ·5546, consists of:—

	By weight.	By volume.
Carbon	75·4 per cent.	1 part
Hydrogen	24·6 ,,	2 parts

This gas explodes with mixtures of air, varying from 4 to 14 times its volume of air. The most explosive mixture is one part of carburetted hydrogen to nine parts of air; these mixtures will explode at a white heat, but not at a red heat. With less than four parts of air the mixture extinguishes flame and destroys life: 1-30th part of gas to one of air shows on the candle a light blue top; 1-12th part of gas to one of air gives a light blue flame in a safety-lamp, and 1-8th or 1-9th of gas to one of air gives a bright flame in a lamp.

Olefiant gas, or heavy carburetted hydrogen, is found in manufactured gas, as used in houses; it has twice the volume of carbon as compared with light carburetted hydrogen, and is of greater illuminating power. Specific gravity, ·9784. This gas explodes at a red heat, but is rarely found in coal mines.

Sulphuretted hydrogen is found where pyrites are decomposed; it inflames at a red heat, and is, consequently, more dangerous than ordinary fire-damp, as it will frequently be produced in coal mines. Specific gravity, 1·1747.

It consists of—	By weight.	By volume.
Sulphur	94·15 per cent.	1 part
Hydrogen	5·85 ,,	5 parts

Hydrogen gas is slightly inflammable. Its specific gravity ·0691. There are instances on record of this gas being found in coal mines, but which are questionable.

When coal is burnt, the oxygen in the air combines with the carbon of the fuel, producing carbonic acid gas, and nitrogen is set free. Carbonic acid gas, or black-damp, has a specific gravity of 1·5277.

And consists of—	By weight.	By volume.
Oxygen	73 per cent.	1 part
Carbon	27 ,,	1 ,,

Air mixed with 1-10th of its volume with this gas will not support combustion: a mixture with 1-12th of gas is dangerous to life, and with 1-20th of carbonic acid gas to one volume of air combustion is greatly impaired. A mixture of 1-7th in volume of this gas will render inexplosive the most inflammable mixtures of air and fire-damp.

Nitrogen gas when breathed is fatal to life: its specific gravity is ·976, and, as before stated, is probably often produced in coal mines.

These, then, are the gases which would accumulate, one or more of them, in every working mine, unless provision was made, by circulating currents of air to carry them off; these currents varying with the amount of gas given off, more particularly the amount of carburetted hydrogen, which demands unceasing attention, so as to keep constant streams in circulation for its removal.

We may describe, in conclusion, the code of laws by which, we are informed, the working of mines in Saxony is governed, and which resemble those for regulating the mines in the Hartz district. The Superintendent of Mines, a Government officer, has control over all the mines of his district; he grants all concessions to adventurers. Every practical facility is given to encourage steady working of the mines, and to have them carried on to the greatest advantage. Records are extensively preserved, to which those interested in the working of the mines have access; and when a mine is closed, or suspended, great care is observed, and a minute account is preserved of its condition. When a mine is to be stopped, the Superintendent and Inspectors of mines visit the works, assay the ore, note its condition and value, the size of the vein, hardness of the rock, inclination, proportion of ore it contains, and all other particulars as to depth, size, and length of the various galleries. The workings must be carried on by the adventurers with the concurrence of the Superintendent of Mines, according to a certain plan, a share of the adventure being reserved for the Sovereign, who claims the whole of the underground property, and has absolute control over the management.

Some of these provisions, which apply to silver, copper, and lead mines in Germany, might with advantage be introduced for the government of coal and metalliferous mines in Great Britain, more particularly the provision for accounts to be taken and records preserved of the exact extent of workings and the condition of every mine which has ceased working; and the cause which has led to such suspension. This, if established, would be a guard against the danger from inundations of water in approaching abandoned workings. The laws of Saxony, in this respect, contrast strongly with our supineness and indifference in establishing similar wise and necessary precautions, which have for their object the protection of life and property, and the economical working of the mines. C. E.

COAL MINING IN SOUTH STAFFORDSHIRE.

Sir,—The *Mining Journal* of Oct. 10 and 24 contained communications criticising the recently-published report of the Government Inspector of Mines for the South Staffordshire district. The one is headed "A Coal and Iron Master on the Coal Supply of South Staffordshire," the other "Another Coal and Iron Master on Mining in South Staffordshire." They are not, however, and do not purport to be, letters from persons occupying this position, but are put forward as a sort of re-cast of such letters, which the actual writer seems to have had as his groundwork. The writers, therefore, are not only hidden by the adoption of the anonymous style of writing, but they stand obscured in the shadow of another shade, and though it is plain from variations of style that there really is "A Mrs. Harris" in the case, it is at times uncertain whether we are reading the sentiments of one of "the coal and iron masters," or those who profess to be such, or of the wet nurse of their literary offspring. As one who has taken some interest in the attempt to interpose by legislation for the protection of the lives and limbs of the miners of the country, I beg to offer a few remarks in reference to these attacks.

In the second letter there is a gently insinuated complaint that Mr. Baker does not fraternise with the local association of Mine Agents in his district—that is, with an association founded and carried on with the distinct design of opposing the Inspector, against whom its members have put forth the strongest charges, whilst they have sought to prejudice him and the stipendiary magistrate in the eyes of the public by a report of the case "Regina *v.* Cope," appended to which was a plan of the workings, as you showed on Oct. 16, entirely changed from those of the surveyor of the colliery, whose name was, however, attached to this gross misrepresentation. It would, indeed, be strange if the Inspector should be found acting with an organisation founded with such an object, and fighting with such weapons. One cannot but feel that the battle-field—"Regina *v.* Cope"—on which so confident an array was marshalled, has been abandoned, and a new ground of attack selected, but the impulse to the fight is evidently the same. If an association were formed really for the purpose of promoting scientific mining, and diminishing loss of life and injury from accidents, Mr. Baker would be to blame if he did not show a friendly disposition towards it.

Dismissing this remark, important only as a sign of animus, there are two main grounds of complaint in these communications—the one is that Mr. Baker has under-estimated the duration of the coal supply, the other that he reflects with undue severity on the evils of the "butty system," and insists too strongly on the supervision required to avoid the evils incident to its working.

The first cause of complaint may be disposed of in a few words. It is part of the duty of the Inspectors to obtain from proprietors of mines in their districts returns of the quantity of coal annually raised, and to state the result in their reports. Mr. Baker, in doing this, has simply added that—

"Such a large and continuous drain on the mineral resources of this district must at no very remote period, and, indeed, within a few years, completely exhaust the supply, so far as the coal can be wrought for the purposes of iron manufacture."

He further observes that—

"There will, however, still be thin seams of coal left suitable for domestic use."

It is impossible to answer in detail the long series of vague state-

ments of what the writer, who is unknown, says another writer, known to him but to no one else, avers that other people known to the second unknown man are doing or saying on the subject. Does any man, woman, or child regard it as an answer to Mr. Baker's anticipation that a supply remains to be got by demolising towns containing many thousands of houses, especially when one of those mentioned is stated to be already completely undermined? Again, it is a singular sort of proof of the abundance of thick coal that admirably constructed blast-furnaces have been pulled down to get what lies beneath them. Let me ask these writers a simple question—How many iron and coal masters in South Staffordshire have an ungotten supply of coal available, taking into account quality and cost, for the manufacture of iron at the present rate of production for the next 20 years? Take the largest, and, indeed, almost the only extensive owner of thick coal—the Earl of Dudley. Will any of these writers affirm that a responsible agent of that great proprietor of the most valuable seam of South Staffordshire coal will stake his credit on the statement that the present rate of production from his extensive mineral property can be maintained for much more than 20 years? As for paying 15s. a ton for coal to make iron with to export to America and the Continent, not a word need be said in refutation of so vain a dream. How many ironmasters now give, or could afford to give, much above half the price—statute weight? It would be as idle to defend Mr. Baker from censure for not advising the Government to enter into experimental sinkings into outlying formations, as it would be ridiculous to praise him for knowing his duty better than to intrude such a suggestion upon the executive authority.

The other charges are, however, somewhat more worthy of notice. They centre in the alleged tendency the butty system has to cause a course of mining management involving danger to life. The necessity for supervision, independent of the butties, and for maintaining the responsibility of the owners, are mere corollaries of this first proposition. If it be a fact that the butty or contract system of working minerals naturally tends to a dangerous course of mining, the necessity for placing the responsibility on the owners who employ and the agents who superintend these contractors becomes evident. The most extraordinary feature of this attack is that Mr. Baker is represented as being the first to speak of the butty system as involving evils in mining management, and particularly that Mr. Brough, a former Inspector of the district, dealt with it in an exactly opposite spirit. Now, what are the facts? Mr. Brough, like every writer on South Staffordshire mining, has always pointed out the obstacle which the butty system presents to an improvement in mining. In his first report for the year 1856 he says of butties or chartermasters—

"They are for the most part good practical miners, because in fact they spring from the ranks of the workmen; however, for that very reason they are deficient in education, and, consequently, *the increasing necessity for the application of scientific principles to the art of mining undergoes obstruction.*"

He goes on to say—

"The requirement of the ground bailiffs to be responsible for the safe condition of the mines under charge is evident from this fact—the 'buttles' act in the capacity of *contractors*, and, therefore, the necessity of the direct intervention of the viewers."

The next year he writes—

"The system presents an insuperable obstacle to scientific improvement, and is subversive of discipline."

In his report for 1858 he says—

"The working of collieries by 'charter' or contract has never been considered by me as advantageous either to the masters or workmen."

Not to quote other references in the same spirit, Mr. Brough after he had gone to another district thus writes from Clifton, in his report for 1861—

"Whilst in Staffordshire I invariably made mention in my annual reports of the nature and of the tendency of the chartermaster system. In some places in my present district coal and ironstone are also got by contract, but it is not *the absolute possession of the pit, and exclusive mastery over the people, that prevails amongst the butties of South Staffordshire.* Nevertheless, I should like to see the time arrive when the contract method of working minerals will be altogether done away with in every part of the kingdom; it is, unquestionably, *an insuperable obstacle to all progress* wherever it is found to exist."

Mr. Brough wrote thus, and was presented at a dinner given by the mine agents with a claret-jug when he left. Mr. Baker speaks in the same sense, and acts upon the principle that this defective system requires close supervision, and he is attacked with bitterness. How is it? Does it not suggest that these attacks are instigated by feelings they do not represent? Is it not that Mr. Baker got a verdict in "Regina v. Cope," not only from the magistrate, but at length, when the dust which was raised to blind the eyes of the public settled down, from everyone who paid attention to the matter, and considered it with an impartial mind. The butty system, says Mr. Brough, especially as it exists in South Staffordshire, where the butty has "the absolute possession of the pit, and exclusive mastery over the people," interposes "an insuperable obstacle" to improvement. "Certainly," says Mr. Baker, "and hence I shall enforce the cardinal principle of the Act of Parliament, and which is to hold the owners and their agents, having on their behalf the care and direction of the mines, responsible for the general management. He might well say—

"The very head and front of my offending
In this consists, no more."

It is unnecessary to quote what Mr. Wynne, who preceded Mr. Brough, said to the same effect; but it may be noticed that in his report for 1856, noticing the objection of some of the viewers or ground bailiffs in South Staffordshire, that the special rules cast upon them "more than a due share of responsibility," Mr. Brough says—

"I do not coincide with them in this view of the case, because there are special local reasons for requiring the viewers of this district to be always answerable for the ventilation and otherwise safe condition of the mines placed under their charge."

The writer might have foreseen the very case which has caused this stir, so aptly do his remarks apply to it by anticipation.

One word as to the recommendations that a minimum penalty should be fixed, and that a higher scale of fines should be adopted. The first is justified by the extraordinary difference in the penalties imposed by different benches of magistrates for offences precisely similar. As to the suggestion to raise the scale, Mr. Baker himself notices, in his last report, that in a case heard at Stourbridge, in August last year, the magistrates, after inflicting the full penalty, expressed their regret that they had not the power to impose a much heavier fine. Indeed, nothing can be clearer than that if proprietors of mines and their agents are to be fined at all, a few pounds to them is, to use a phrase in one of the articles referred to, a "mere fleabite."

Mr. Baker, in strict conformity with the views of his predecessor, Mr. Brough, insists that the responsibility for the safe conduct of mining operations must mainly rest upon the owners, and on those acting on their behalf and directly employed by them, and not on the butties or contractors. Such a requirement may involve an increased staff to superintend the workings, and it seems not beyond the bounds of charity to suppose that in pressing this principle home he may have touched some coalmasters in their tenderest place—their pockets, and *hinc hæ lacrymæ*.

AN OBSERVER.

MINERAL PROPERTIES—CREATION OF MATTER.—No. X.

SIR,—Thus far we have tried to find our way back to the creation of matter by the light of science only; if we turn to Divine Writ, we shall there obtain great light by the account as given by Moses. It should be here observed that Moses does not profess to give a strictly scientific account of the creation; he rather gives the leading facts of each epoch, as they were presented, by some means, to him. Neither does the Bible, according to Dr. Chalmers, fix the date of the earth's formation; it merely says—"In the beginning God created the heaven and the earth." That, says Dr. Chalmers, is a complete sentence in itself, and has not necessarily any connection with what follows. That beginning may mean any number of years, or ages, ago; consequently, the Bible and Geology cannot clash on this point, as no date is fixed. The date of man's creation alone is given; and even this is somewhat obscure, as eminent chronologists, as Hales and Usher, vary; while upwards of 140 different dates have been assigned to the creation.

Moses says, further—"And the earth was without form, and void; and darkness was upon the face of the deep." What can this mean? The earth was without form, and void. If it were as yet without form, it could not have been fashioned into a material substance, because all matter, as distinguished from gases, must assume a form. May we not reason from this that the earth was as yet in a gaseous state, and that those gases were all mixed together, not in definite proportions, but in a chaotic state? Therefore the earth was at that period void—*i.e.*, it was not as yet capable of sustaining animal or vegetable life. "And darkness was upon the face of the earth." There was as yet no sun created, no fountain of light existing, to brighten the gloomy abyss with its life-giving rays. "And the Spirit of God moved on the face of the deep." "Order is Heaven's first law;" because when the elements were called into existence, if they were not in certain proportions they would be turbulent, and instead of uniting together they would wage war with each other: this is given to be understood by the word *void*. The first act of the Eternal Spirit, after exercising His creative power in calling the elements into existence, is to move on the face of the chaotic mass, and establish the first degree of order. Thus far has Revelation come to the assistance of frail human reason, and has revealed a mystery to us we never could have unravelled. After this, reason can take up the theme to advantage, and read pretty clearly by the light of science. Moses also gives us an account of the six days of creation, and of the work done on each day. The first day light was created, and the darkness was separated from the light. The second day God created a firmament in the midst of the waters, and the firmament divided the waters which were above from the waters which were under it. It is, perhaps, difficult to point to any such division of the waters as this. Several interpretations have been put upon it—such as that the interior of the earth is water, and that this is in harmony with the expression in the Psalms, "He hath founded it (the earth) on the seas." Others direct us to the power of saturation known to be contained in the air, by which there must always be water in the atmosphere. But, perhaps, it would not be unreasonable to ask if this is water, such as we are acquainted with? or whether the terms deep and water, such as are applied to the first state of the earth, may not be emblematical; and if it would not be proper to call the confused, chaotic mass of elements water, on account of their turbulent, restless nature in that state? The third day's work was to separate the waters and dry land; after which we obtain vegetable life—grass, herbs, and trees, whose seeds are in themselves; that is, they contain the means of propagating themselves. The work of the fourth day is to create the sun, moon, and stars. On the fifth day fish and fowl are created. On the sixth day cattle, and every creeping thing, reptiles, beasts, &c., with man, were created. After this it is said that God rested—that is, He ceased exercising His creative power for the time.

In this account we see that the creation is marked out by six distinct steps, called days. We also see that the work of creation is ascribed to the self-existing Deity; and it says he created it—that is, he made it—without any previous material. Because, however much learned men may differ about the meaning of the verb *bara*, there seems to be an evident distinction between *created* and *made*. It is said that He created the heaven and the earth; but He made man. He formed man out of the dust of the ground, or from material that was already created, by being modified. This, analytical chemists tell us, is the truth, and that all the substances found in man's body, such as phosphorus, lime, iron, &c., are to be found in the earth. It is also said that He rested from all the work which He created or made. This would seem to imply that He had endowed matter with the power of propagating itself. I do not think, however, that matter, if left to itself for millions of ages, would produce man or beast, or any life higher than itself. In fact, "like begets like" is the general law of nature; therefore, we must call in a higher power than is inherent in matter to account for animal life, and much more so to account for human faculties and the higher powers of the human mind. We also see in Moses's account that there is an adaptation to circumstances; as, for instance, herbs and grass were created before cattle, the sea was prepared before fish were brought into existence, the air was created before fowls, and all were created before man.

The question as to whether the history of the creation as related by Moses agrees with the "testimony of the rocks" is a very difficult one, and would be, perhaps, premature to attempt a complete reconciliation between the two records as yet. Science will, no doubt, make great strides forward, and many truths that are as yet latent will come to light. There will be many a Newton, Buckland, and Cuvier yet born, who will unravel mysteries that have been hidden since the divine fiat went forth, and will unfold principles that have been working unperceived since the first morn of creation. The labours of Chalmers, Pye Smith, Miller, and others to attempt this are well known; and although they were men of great learning and undoubted sincerity, the state of science at the time did not appear to admit of this. We have no doubt that, with fuller light, they will ultimately be reconciled.

The chief points of difficulty appear to be the following:—First, as to the term six days; are they six natural days, such as we have now, of 24 hours each? If so, the geologist says, that time is as nothing as compared with the time required for the formation of the different strata we meet with in the crust of the earth. It requires ages upon ages, so vast that the human mind shrinks from contemplating it. Indeed, Hershel says that it would take 2,000,000 years for the light of the furthest planet that can be seen through a 40-ft. telescope, to reach our earth, although light travels at the rate of 12,000,000 miles in a minute! and Moses says that the stars were not created until the fourth day. The sun also rules our day and night: when the sun appears it is day, and when it disappears it is night. But as the sun was not created until the fourth day, it is difficult to see how these days could be of 24 hours each. Let us suppose these divisions to be long epochs, and the difficulty will be entirely removed.

Another difficulty is as to how the order of fossil remains in the mesozoic, paleozoic, and hypozoic divisions of the crust of the earth agree with the account given by Moses. In the Bible account we have the following order:—

1.—Vegetable life: *a*, grass; *b*, herbs; *c*, trees.
2.—Animal life: *a*, fish; *b*, fowl; *c*, great whales.
3.—Animal life: *a*, cattle; *b*, reptiles; *c*, beasts—supposed to be animals of prey; *d*, man.

Now, the question is whether we can reconcile the order of fossils as found in the earth, from the Lower Silurian to the Tertiary, with this order. If we fail to do so now (and it would take a far abler pen than mine to attempt it), we have little doubt that, with additional scientific light, especially of chemistry and comparative anatomy, this will be done.

Another point of difficulty is, how light was obtained before the sun was created. All we know at present is that the sun is the fountain of light; and we cannot conceive of universal light except as proceeding from the sun.

Lastly, we have a difficulty in reconciling the idea of vegetable life existing before the sun was created. The sun's rays have been found to contain the three principles of light, heat, and actinism. Each of these has been found to have its own work in the production of vegetation.

"Of these, the luminous principle is that which paints the world, and decks our fair creation in all its glories—which, softened, tinges the blue heavens above—and, reflected, gives warmth of colouring or depth of tone to the flower beneath. The calorific principle spreads life and motion round the world, bids the seed awake, the wind arise, and the water flow; and the chemical principle acts assiduously, not only on all animate but on all inanimate bodies—quickens life in the plant, and effects a thousand molecular changes in various substances."

Well-conducted experiments have led to the following results:—Light gives colour to the vegetable world, by the production of chlorophyll. Plants grown in a dark place, although there is heat, have but little, if any, colouring. Heat makes them buoyant and strong, whilst it is under the influence of actinism that seeds germinate. Science has not yet taught us how vegetable life can be produced and sustained without these influencies.

There is one thing, however, Moses does not take upon himself to give a strictly scientific account of the creation; he merely gives an account of it as it appeared to him. He gives us all the chief facts, and refers us to the source from which everything springs.

SAMUEL JENKINS.

[*To be continued in next week's Journal.*]

THE ARTICLES ON MINERAL PROPERTIES, AND THEIR REVIEWERS.

SIR,—I have received several private communications referring to my series of articles which are appearing in the Journal, besides the comments which have been published. I would wish it to be distinctly understood that I am anxious, and invite any fair criticism or discussion; yet, I feel the weight of my different subjects far too much to introduce anything personal. Allow me, therefore, to state that I will under no circumstances enter into a discussion, or notice anonymous articles in the Journal, or if the writer is not prepared to enter into the discussion in a fair spirit. Any gentleman wishing to meet me fairly, under his proper name, I will gladly answer him; and if anyone can point me to an error, either in principle or detail, no one will feel more thankful than myself.

SAMUEL JENKINS.

ON THE WASTE OF MINERAL AND OTHER NATURAL PRODUCTS.

SIR,—In last week's Journal I observe an extract from the *San Francisco Mining and Scientific Press*, giving a description of a process whereby all loss of float gold is said to be avoided, and perfect separation secured, by passing the pulverised ore through a bath of melted zinc. To a person unacquainted with practical reduction operations on ores of the precious metals, this method of working will doubtless appear very attractive, as the passing of powdered ore through melted zinc is as inexpensive and expeditious a system of operating as can be well imagined, and not to be beaten by those wonderful furnaces which are said to effect the desulphurisation of ores by simply letting them fall from the top to the bottom of a tall chimney, through an ascending flame. Melted lead and mercury baths having long ago been proposed, tried, and failed in producing the effect now claimed by the use of zinc, the idea may be considered, in point of fact, to be utterly impracticable and Utopian, the inventors of such processes apparently losing sight of the fact that in all reduction operations on ores of gold and silver *time* is an indispensable element of success, whether in arresting the loss of float gold, or calcining the sulphuretted ores or tailings previous to amalgamation.

That some really practicable and cheap system of working the ores of gold and silver, that shall diminish, if not put a stop to, the enormous loss now sustained, is most urgently demanded may be conceived after a perusal of Mr. Arthur Dean's masterly report on the Pestarena Mines and Reduction Works, wherein he states "*That not the one-half of the gold in the ores of any of your mines is saved. If you extract* 1 *oz. now, you may be sure the ore contained above* 2 *ozs. per ton.*" And, again—"At the present time there are 15,000 to 20,000 tons of ore laid open, worth upon assay value 100,000*l.*, which by the present mode of reduction are almost worthless." Mr. Dean further states that "roasting in heaps has been tried, but only rendered the reduction more difficult." This result will not surprise anyone at all acquainted with the reduction of refractory gold or silver ores; roasting in heaps is at best but a process of semi or imperfect roasting, suitable enough for a certain class of copper ore, but quite out of place in the case of the precious metals, wherein imperfect calcination is attended with worse results in amalgamation than none at all.

As this rude system of working appears to have been the only effort made to overcome the chemical and metallurgical obstacles to perfect amalgamation presented by the heavier or metallic constituents of the ore, and the float gold being inevitably lost, without any attempt at its recovery, by the present mode of operating, we cease to be surprised at Mr. Dean's statement, "*that not the one-half of the gold in the ores of any of your mines is saved;*" and admire the resolute and outspoken manner in which this gentleman faces the difficulty.

Had a rigid chemical analysis of these refractory ores been given in Mr. Dean's report, a better idea might have been formed as to the alterations and improvements required in order to bring about a better state of things, as without an accurate knowledge of the constituents of the ore any attempt at improvement in its reduction is little better than groping in the dark after the desired object, or going to sea without a compass. In recommending the adoption of blankets rotating tables, &c., for the recovery of pyrites in the tailings, and a furnace for roasting the same previous to re-amalgamation, Mr. Dean gives excellent advice so far as it goes; but this only meets that portion of the loss at present sustained in the heavy or metallic constituents of the ore or tailings, leaving the loss in *float gold*, generally the most considerable, still untouched.

Most of our large gold mining companies are losing their precious contents in much about the same proportions as the Pestarena Company. Whether or not their directors and superintendent will acknowledge it as frankly as has been done in this instance, this important disclosure more than confirms the statements I made in my communication to you on June 6 last, wherein I drew attention to the enormous loss going on at the Comstock lode, in Nevada, in consequence of imperfect reduction, and intimated the success that had attended my efforts to overcome the difficulty up to that time, when I had succeeded in extracting 62 per cent. of the assay value from the slimes, which had never given more than 17 per cent. by the ordinary mode of treatment. Since then I have continued my experiments on various classes of gold and silver ores, and by getting rid of certain defects, and through the valuable assistance of my friend, Capt. Paul (the late manager of the Chontales Company), in introducing som ingenious and important mechanical improvements into the apparatus, I have at last perfected a machine that I believe will, in all cases, secure the *whole of the float gold;* that which goes off in heavy tailings will, of course, have to be submitted to furnace, or other, treatment previous to re-amalgamation.

My last experiment was made on some rich ore from the Consuela (Chontales) Mine, in the presence of some gentlemen deeply interested in the matter. After *one hour's* working in the machine the tailings were assayed, and the result showed that 90 per cent. of the assay value of the ore had been removed, only 10 per cent. of its contents remaining in the heavy constituents of the tailings, which can doubtless be recovered by a proper system of concentration—roasting and re-amalgamation.

I may add, in conclusion, that the machines are extremely simple and inexpensive; portable, durable, and easily repaired by an ordinary blacksmith when out of order. Capt. Paul will shortly introduce them into Nicaragua, and I trust soon that I myself shall be in a position to exhibit a model on a working scale, whereby parties interested may try their own ores, and thoroughly test the value of this invention.

W. T. RICKARD, F.C.S.

Assay Office, 2, *Crown Chambers, Threadneedle-street, Oct.* 27.

MINING, AND THE PRESENT POSITION OF THE METAL MARKET—No. II.

SIR,—In my last letter I introduced for the consideration of such of your readers as are investors some remarks which I hope were of importance, showing that, notwithstanding the various unusual and unfavourable circumstances which of late years occurred in connection with mining, yet *bona fide* investment in progressive mines has, on the whole, been as profitable as any other form of business, and that the assertion would, probably, be well founded that it has been more remunerative than any other. Some general allegations were made in proof of this assumption, the details being withheld from an unwillingness to transgress too much upon your space in that letter. With your permission I shall now furnish some particulars to verify those conclusions. I affirmed that by railways alone 200,000,000*l.* sterling have been lost, the 100*l.* stock then selling at an average of 47*l.* 10s. per share, the average this week being still less, a little under 47*l.* per share. Thus, Bristol and Exeter loss, 25 per cent.; Caledonian loss, 28 per cent.; Cambrian loss, 75 per cent.; Dublin and Belfast loss, 25 per cent.; Great Eastern loss, 59 per cent.; Great Western (original) loss, 50 per cent.; Great Western and Wales loss, 43 per cent.; Great Western and Mid-Oxford loss, 74 per cent.; Great Western and Newport loss, 70. These are only some of the many which might be quoted. In like manner investors in banks have been great losers. In the Albion, 33 per cent.; the Alliance, 50 per cent.; Anglo-Italian, 50 per cent.; Otago, 50 per cent.; English Bank of Rio Janeiro, 14 per cent.; Mexico, 40 per cent.; London and Brazil, 60 per cent.; on the New, 71 per cent.; Merchant, 25 per cent. This list might also be greatly extended.

If we take miscellaneous, there is no department in which money has not been sunk with disadvantage to the capitalist. In this day's papers there is an account of a general meeting yesterday of the Royal Mail Steam Packet Company, which is simply a record of disaster, such as one never hears of in a mining company; and every day nearly, under the head of miscellaneous, we have evidence enough in the journals that "all is not gold that glitters," and that the worst instances of mismanagement, or ill luck, in mining are far exceeded by the trickery, ignorance, or misfortune shown in the history of companies in every other direction. If we look into the investments in foreign Government stock, their story is more romantic than inviting. Our English capitalists have become financially connected with all the revolutions, depositions, civil wars, repudiations, court de-

baucheries, and extravagances over the civilised—that is, the money borrowing—world. Russia wanted money to make railways for military strategic purposes, which might ultimately be injurious to England or her allies; the amount was easily raised. Another war with Russia on account of her encroachments in Central Asia, and on the shores of the Caspian, as well as her known designs beyond the Danube, and against Norway, may enter into the policy of English statesmen as a necessity, however reluctantly; of what value would the guarantee of the Imperial Government then be? France, although not extensively in debt to us, is in a position to injure a considerable class of investors in case of war. That such might break out any hour is certain. The ambition of the Emperor is only restrained by the vigilance with which he is regarded by other powers, and by their people. Investors in Spanish bonds have burnt their fingers more than the most reckless of mine adventurers. Who feels sure of Egyptian or Turkish States, which are always making new arrangements in connection with new loans, with a view of repudiating old obligations. Even in the United States securities the risk is considerable. There are many questions between the two peoples, at all events the two Governments, not yet ripe for discussion, as well as those which are on the tapis. We should like to know what mine turned out a worse speculation than the Confederate Cotton Loan. As to Mexican and South American stocks, there is not an hour's certainty of non-repudiation or tranquility. Of late years investments in agriculture at home and in the colonies have become popular, some have been utter failures, and few, if any, have paid a good percentage.

Now, Mr. Editor, in the face of all this, will your investing readers keep up the foolish cry about the dangers of mining? Let them cry out as loudly as possible, and "make the welkin ring" with their denunciations of jobbing, "bulling," "bearing," &c., in mining shares, which are only of nominal value, or the worth of which do not rise or fall, according to the rigging of the market; but it is untrue, and therefore unjust, to represent *bona fide* mining as either precarious, deceptive, hazardous, or unprofitable. They have their risks. What investment is free from them? not even Consols, as might be proved. A time might arise when Consols would be absolutely unsaleable, in a period when trade and enterprise offered secure and large remuneration to investors. An ocean steam navigation company may have to leave its station from pestilence, its ships may have to put back or go into port from stress of weather, or founder, or strike; they may be consumed at sea, or thrown by earthquake shattered upon the shore. All these casualties have occurred so lately as to be in the memory of everyone. Insurance companies may languish for want of cliants, or a course of ill luck may happen upon policies. The merchant's store and the manufacturer's mill may be consumed or struck down with lightning. The agriculturist may see his crops perish from blight or drought, from the worm or locust, from the flood or the storm which wrecks his fruit trees and his farmsteads. Now, it is notorious that metallic mines are free from all these casualties. If water come in it can be pumped out with suitable machinery, and shafts and adits are completely under the control of engineers, and even common workmen. In comparison with numerous commercial, maritime, manufacturing, planting, and agricultural pursuits, in which money is freely invested, mining is safe and certain.

Let us examine a few proofs of success on a scale of considerable extent, and therefore not merely individual instances of extraordinarily lucky mines. The following British lead mines show the following proportions of profit per annum:—Bronfloyd, 10 per cent.; Bwlch Consols, 25 per cent.; Cwm Erfin, 37 per cent.; Cwmystwith, 14 per cent.; East Darren, 25 per cent.; Foxdale, 12 per cent.; Great Laxey, 50 per cent.; Lisburne, 70 per cent.; Minera, cent. per cent.; South Darren, 9 per cent.; West Chiverton, 80 per cent.; Wheal Mary Ann, 37 per cent.; Trelawny, 72 per cent.; Herodsfoot, 80 per cent. The shares of many of these mines are selling at a great premium, greater than is known in the instances of any other companies; yet in most cases the amount paid is small, but upon that small investment large profits are derived.

In the Gwennap and Redruth mining district, Basset formerly paid profits at the rate of 800 per cent. per annum; Carn Brea, 66 per cent.; South Frances, 100 per cent.; Treviskey, 20 per cent.; Buller, 280 per cent.; North Basset, 8430*l*. The outlay upon a mine upon the old Cost-book System may be actually nothing. The mine is opened, and at the end of every two months there is a comparison of cost and returns. It has often happened that at the end of the first two months the returns for ore exceeded the cost largely, and this continuing, of course there would be large returns of profit, while the return for outlay would be *nil*. These districts have been profitable for mining operations from time immemorial. You may go from Camborne to Redruth, 200 fathoms below the surface, upon the same range of veins—the ends of one mine being extended so as to meet those of another. Yet, in the face of all those facts as to the scientific character of mining operations, and to their enormous rate of remuneration when proper skill and sufficient capital are employed, some men talk of mining as a mere bagatelle; that it is a lottery, consisting of a few prizes and many blanks; and some have been foolish enough to describe it as holding blanks only. It is no dark, abstruse work, no gamester's throw. It depends upon the science of the geologist, mineralogist, or practical miner, for the discovery made; upon the capital and good sense of the men who go shares in the undertaking; upon the judgment of the mining engineer, who lays bare the ore by shafts and adits, as his science, or it may be genius, and certainly practical experience will direct. Of course, if trade be dull, or imports large, prices, and therefore profits, will be lower; but such will be the case under like circumstances with all other productions. Whereas, under ordinary fair trade, none of them yield such good results to the fortunes of the possessors, or are so little influenced by chance, accident, or convulsions of nature.

It is often very foolishly urged that the mining share jobbers use their facilities unjustly, and to the public injury, and that tricks are perpetrated which are fraudulent and shameless. The like does occur, but *bona fide* mining investment has nothing to do with it, any more than the manufacture of iron or cotton cloth, or the produce of tea, coffee, or sugar has to do with any tricks or frauds perpetrated by brokers, agents, consignees, &c. But are there really worse men or worse deeds in connection with dealings in mining shares than in any other? I do not believe it; and boldly say it would be impossible to prove it. Have the ethics of railway directors been as commendable as those of mining directors? See the proceedings before the Lord Mayor yesterday as an instance, without laying any blame upon any particular person, of the precarious management and dealings of a great railway undertaking. We remember some time ago a slate slab quarry company being formed to work a property in Wales, and when the produce was brought to market it consisted of stone flags, instead of slate slabs. We remember a case of a manufacturing company which paid dividends, and manufactured nothing. It it not in the realms of mining that such great public scandals as Overend, Gurney, and Co. occurred. If we want to see gambling, and worse than gambling, the taking up of the money of others, without giving them even a gambler's chance, we must go among the banks, finance companies, railways, and miscellaneous, not amongst the generally intelligent, hard working managers, directors, and investors in connection with British mines.

I have no doubt, Sir, that the time is not far distant when we shall have no such complaints to make of the error and ignorance prevailing as to mining operations and investment. "Time works wonders"—*magna est veritas et prævalebit*. That which obscures and obstructs is destined to pass away in all things. The moon may hide the sun's disc, but the eclipse passes away, and the unobstructed glory again beams out upon us. The night dies, and a new day is born to smile upon our hopes.

Perhaps the very evils and erroneous impressions which have obstructed the progress of mining may ultimately subserve it by teaching prudence, economy, vigilance, and stern rectitude. Apparent evils often work good. The lightning which smites the tower, rends the clouds, and sends down the fructifying shower; the storm which shatters the dome, the orchard, and the forest, purifies the atmosphere, and brings us health. The breeze which floats over the stagnant pool will also pass on laden with the freshness of the park and the odour of the pasture. All departments of the Divine government display parallels in each as compared with every other, The noxious, or apparently noxious, in Nature works out with temporary mischief lasting good. The revolutions of nations secure ultimate liberty. The mutations of public opinion, even its prejudices, serve the purpose of analysing truth. None hold faster a truth they have once grasped than those who were most prejudiced against it. The truth which takes a mind by storm keeps hold of the fortress for ever. Mining as a business will be no exception, the prejudices created against it in uninformed minds will be forced out by the assault of truth, and new friends will join in the enterprise so useful to our country and the world.

THOMAS SPARGO.

Gresham House, London, Oct. 29.

THE MINING REGION OF NEVADA, U.S.—No. II.

SIR,—The mining districts are usually from 10 to 20 miles square, though governed by the physical features of the country, and the contiguity of other districts. Reese River district was the first organised in what is now known as Eastern Nevada, and its mineral belt comprises an area on the western slope of the Toiyobe Mountains of about two miles in width and seven in length. The dimensions of the district were formerly greater, but the area mentioned comprises what is now considered as the Reese River mining district. Being the first organised, it has given its name to all this section of the State.

Upon the discoveries of Reese River being made public, the crowded mining towns situated on the line of the celebrated Comstock lode became in a shore time deserted of prospectors, and seekers for other "Comstock lodes" abandoned locations which had been made either west or east of that celebrated lode, believing that in Reese River their labours would be rewarded by success; for, unlike Virginia City, Gold Hill, and all along the line of the Comstock lode, Reese River was reported (and developments have proven it true) to contain a number of different lodes, rivalling eachother in the deposits of the precious metals. The mineral-bearing lodes of this eastern part of Nevada were first made known in the spring of 1863, at the time when great attention was called to the subject, as a consequence of the rich developments made upon the "Comstock Lode," at Virginia City, now so celebrated, and from which near $85,000,000 of silver have been taken. Reese River being on the line of the overland stage and telegraph, it was convenient to reach. The site for a large town was surveyed, and Austin was built, now an incorporated city of about 9000 inhabitants. Should its locality be sought for on the map of America, it will be found where is usually marked the vacancy of the "Unexplored Regions," being almost precisely in the geographical centre of the State of Nevada.

The lodes or veins occur in the granite rock, and are from 1 to 5 ft. in width. They generally lie parallel to each other, with a strike north-west and south-east, and a dip to the north-east. The veins are usually explored by means of inclines, commencing where the ore appears at the surface, and following down with the dip of the vein. When, after thus sinking a distance sufficient to render certain the existence and character of the vein, and it is desirable to open it as a mine, a perpendicular shaft is sunk at a point some distance from the outcrop, as the ground permits, calculating to pierce the vein at a depth of several hundred feet beneath the surface. Through Reese River district a belt of superior ore runs from the southern part of the district northerly into Amador district, and has been found in the Chase, George Knapp, and other mines in New York Canon, which is the boundary line dividing Reese River district from Amador. The lodes or veins of Amador district are larger in width than those of Austin, and carry exactly the same character of high grade ores. On or near the surface is found chloride of silver, but when water has been reached the ore changes to sulphuret of silver and ruby silver. There are many mines in Amador district which are now unworked for want of capital, and also a proper knowledge of mining engineering, which is so essential to the successful opening of a mine. I have examined the Amador, Fashion, Chase, George Knapp, Carrie Knapp, and Jennie Thompson Mines, and low grade milling ore is found upon the "dumps" of all of them; yet upon almost every one of them work has been suspended. Work upon them is only done in conformity with the district laws to hold the mines. On asking the parties in charge why these mines were not being worked, I was informed that "their owners were scattered in different parts of the monetary world, hunting capital to enable them to develope their mines." This is the case in almost all the mining districts of this State.

In Reese River district I have been very much interested in examining some of the most productive and, of course, the richest mines that I have yet seen in this State: and I will also add, the most systematically opened of any mines east of the Comstock lode—the Great Eastern, Timoke, Oregon, North Star, Florida, Diana, Providential, and a host of others producing rich ore of a uniform character when the water level has been reached. On Lander Hill, along the base of which the city of Austin is built, there are numerous mines, giving the same surface indications as did the adjoining ones—which are now producing so largely of bullion—that are lying idle, awaiting the return of their owners, who are "hunting" capital. I have examined at least 50 mines of this class, which to me have all the characteristics of true fissure veins, and resemble, in all important particulars those which are now paying such large dividends. But the great lack here, as well as in all the new districts south and east of Austin, is capital. Among the most promising of the mines which have only been superficially explored are the Ohio, Illinios, American Chief, Crown Point, Troy, John L. Stevens, Douglas, General Grant, Joe Hooker, and Home Stake—any one of these mines if they had been near the celebrated Comstock lode would have been a fortune to the luckey owners; and its discovery would have created an excitement in all the mining camps of the State which would have rivalled that caused by the discovery of the famous Murphy Mine, in the Twin River district, which is now the "banner mine" of Nevada; but here we are accustomed to see ores so much richer than that produced by the Comstock that $60 or $80 ore is considered of too low a grade to pay for working at present; and then, again, mines which produce ore of a much higher grade are almost daily being brought to notice, and will be mentioned in my next.

MINER.

Austin, Nevada, Oct. 3.

ROYALTON MINE.

SIR,—I am very pleased to know that this mine is opening up in such a satisfactory manner; it makes me rather proud when I think that I was the first man who called attention to this district through the Journal, having always said, through evil as well as good report, that the Royalton Mine would become one of the best paying tin mines in Cornwall. It was I, also, who employed the first man that ever put a pick and gad in this mine, and brought it into its present proud position. The supply of tinstuff here is really inexhaustible; the only question is how it should be developed. It is not like ordinary mining, where you meet with a lode 4, 6, or even 12 feet wide, but this lode (or rather elvan course) is 12 fathoms wide, taking its course due east and west, intersected by thousands of what we call cross lodes, taking their course about north-east and south-west; and if you find a lode (say) 4 feet wide coming into this large elvan, the moment it enters the course it splits into branches of tin, some of which are quite solid, and though these cross lodes may not be more than 4 feet wide, will make the elvan rich for tin for, perhaps, 10 fathoms in length,—a fan is a good representation, small at one end, and spread open at the other.

I have resided in the immediate district during 30 years, and, knowing it well, can tell to a foot of ground where these cross lodes intersect the large elvan for near five miles in length. It should be borne in mind that these cross lodes do not exist in the granite. I see the estimate for this month is 6 tons, and I think that Capt. Seccombe is on the safe side: now that the 25 fm. level is in full operation, my calculation is that 7 or 8 tons could be raised when the shaft is holed to the 25, which is now done. In all my calculations, whatever I promised I always did; and, of course, as the mine is opened so the returns will increase, as there is no *end* to the supply of tinstuff, and I most sincerely wish the company every success.

There are properties both east and west of the Royalton that have been taken up, and will be worked to immense profits. In one of these setts the mine is drained by adit 26 fms., and the sett is 1¼ mile in length, and these cross lodes are rich for tin going into the elvan. It will take a stranger some time to become so acquainted with this district as to find out these cross lodes, intersections, &c.: I have acquired such knowledge from having been a resident in it nearly all my life. As I said in the outset, this will become a great tin district.

London, Oct. 27. THOS. PARKYN.

PRINCE OF WALES MINE, AND Capt. ROWE, OF WHEAL SETON.

SIR,—I am neither a "mad, puffing bull," nor a "growling bear," but a legitimate *bona fide* shareholder, who has experienced the fact that "victory is given to him who can wait." I am, however, personally obliged to Messrs. Ward and Jackman for having, through the Journal, afforded me the opportunity of perusing Capt. Rowe's report, although there can be no doubt the object in publishing it was certainly not to enhance the market value of the shares—that is, if we may judge from the apparently incidental way in which "a Mr. Tonkin" is extolled—yet that has been the result, the shareholders (at least those with whom I have conversed) regarding Capt. Rowe's report as of a much more encouraging character than those of our own agent. Therefore, "after comparing notes" with that which appeared in the Journal of the previous week, we have, by increasing our interest, practically proved that we do know how to "act for ourselves." I have done as bid, and have compared "a Mr. Tonkin's" report with that of Capt. Rowe, and, to my surprise, I find this startling disparity of opinion with reference to one of the most, if, indeed, not the most, important point in the mine—the bottom level. "A Mr. Tonkin" says—"The engine-shaft has been suspended sinking for a long time, in consequence, I suppose, of the ore ground in the 65 having the appearance of being unbottomed." Capt. Rowe (of Wheal Seton) says—"The character of the lode in the two bottom ends leads me to think that should they resume the sinking of the shaft good results would follow." Again, quoting the words of Messrs. Ward and Jackman—"Who is right?" As to the "supposed new lode," "a Mr. Tonkin" thinks it "a waste of money to continue a cross-cut in the hopes of cutting a myth." In my simplicity, I had thought the agent was in hopes of cutting a lode, regarding it as a mineralogical delusion to entertain any "hopes of cutting a myth;" but I would ask "a Mr. Tonkin" what he now thinks of this "supposed new lode," since what has been proved within the past few days? Upon this point I do not want to know "who is right," for the lode, so to speak, answers the question; but I do want to know—Who is "a Mr. Tonkin?"

IGNORAMUS.

PRACTICAL ENGINEERING—STRAINS IN GIRDERS.—An extremely useful little volume has just been issued (through Messrs. Lockwood and Co., of Stationers' Hall-court) by Mr. WM. HUMBER, under the title of "A Handy Book for the Calculations of Strains in Girders and similar Structures, and their Strength, consisting of Formulae and Corresponding Diagrams," with numerous details for practical application. It is very truly observed that the numerous volumes which have appeared on the subject have not, principally on account of their elaborate investigations, been calculated to afford that ready assistance which in the ordinary run of office and other work is being continually needed, while, on the other hand, most of the general engineering pocket books not having been able to afford sufficient space to do justice to the subject, have been compelled to leave its treatment incomplete; so that with a handy little work devoted entirely to bridge and girder calculations, without giving more than is absolutely necessary for the complete solution of practical problems, both the above obstacles to quick and satisfactory manipulation may be overcome. One of the chief features in Mr. Humber's present work is the extensive application of simply constructed diagrams to the calculation of the strains on bridges and girders, the advantages of which as a system most undeniably far outweigh its disadvantages. The parabola (anything but a troublesome figure to draw) and a few right lines are all that are required. The book appears to contain all that is at all likely to be required upon the subject by the practical engineer. It will prove a most valuable work to the profession, whilst its compactness renders it equally well adapted for the office or for the pocket.

FOREIGN MINES.

DON PEDRO AND ANGLO-BRAZILIAN.—The following telegram has just come to hand through the Liverpool agents:—"Troop left Sept. 26, with 34,600 oits. from Maquine, and 7500 oits. Anglo, for Oneida. This remittance is made up as follows:—Don Pedro—Balance of July produce, 4371 oits.; produce for August, 14,094 oits.; ditto cleaned up (for gold troop) to Sept. 26, 16,135 oits.: total, 34,600 oits. Anglo—Balance of July produce, 1492 oitavas; produce for August, 3820 oits.; ditto cleaned up (for gold troop), 2178 oits.: total, 7500 oits.'

SAO VICENTE.—The following letter has been received from the superintendent:—"Sept. 17: It affords me pleasure to tell you that in clearing away the killas (not stone) referred to in part 15 of my last, we have found a line of stone, the size of which I cannot at present inform you, being still buried under large blocks of killas. I am doing my utmost to remove these as quickly as possible, but, owing to the irregularity of attendance and the scarcity of workpeople, the progress is not so great as could be desired. At the eastern section the water was forked, and a pair of borers put to work on the lode on the 14th inst. We have also put a pair of borers to break some stone at No. 2 level west. The lode at this point looks very promising. The small house adjoining the lower stamps has been taken down for the reasons stated in part 8 of my last. On Wednesday, Sept. 9, we put the lower stamps to work with six light heads to stamp the killas from the crush, as stated in mine of the 1st inst. The house alluded to in part 3 of my last, at the jacotinga formation, has been, I am glad to say, completed, and sufficient accommodation thereby supplied for 25 workpeople. At present the attendance is inadequate to our requirements. We shall proceed as soon as we can get a few more workpeople to build a small office at the jacotinga formation. We have commenced to and shall prosecute the works at the cross-cut on the south side of the mountain, and also at the level on the formation, about 100 fms. east of the cross-cut, with the utmost vigour, and, judging from the favourable appearance of the jacotinga, I hope ere long to be able to report a discovery.

UNITED MEXICAN.—Guanaxuato, Sept. 21: Mine of Jesus Maria y Jose.—Little change since my last, though this mine will show far better accounts on the quarter ending on Sept. 30. The extraction of hacienda ore has decreased on account of our reserve workings in St. Andre's and La Soledad having been stopped to fill up and secure the ground. Five or six weeks' time will be required to accomplish this operation. The lower workings are much as usual; the character of the lode in them is very changeable, the ore in San Modesto at times giving us great hopes of improvement and at times falling off. At the beginning of this month a change in the latter kind took place, but now again the work has improved. The buscones have hit upon some very fair ore in the alto (upper part) of the Pozo de Jesus, and workmen from the neighbouring mines have come in. In consequence thereof our sales have improved; they have been as follows:—On Sept. 3, $1138; on the 10th, $1455; and on the 17th, $1856. The accounts for the month of August show an estimated profit of $6471, which more than clears off the loss in July. In September, as we have two raspas, one from Duran and the other from Casas Blancas, we can also count upon a profit, though of no very large amount, because we have less silver than usual to be introduced; and I have availed myself of our improved circumstances to lay in stocks of iron, steel, and powder, to help us over the last quarter of 1868. —Mines in the Guadalupe de la Oscura District: In this district little is doing, but our outlay there is very moderate, and some good ore is coming in to pay for part of our expenses. In the El Oro ground belonging to the Encinillas rights, buscones are at work, and we have a destajo (contract work) going off N.W. which in time will communicate to the El Oro ground and El Carmen adit with the mines of Encinillas and La Providencia. Our outlay last month amounted to $794, with estimated returns of $415, showing a net expenditure of $379, from which must be deducted a small profit on the purchase and reduction of the ore.—Haciendas or Reduction Works: The profits continue to be good, and I hope at the end of the year to render very good accounts of this branch.

MARIQUITA.—Santa Ana: Mr. Treffry writes, under date Aug. 21—The object proposed by the board of directors of placing the mine in a good working condition has been accomplished, and fresh sources of supply have been discovered. We are breaking ore regularly in the 120 and 130 fm. level stopes in quantities sufficient to keep our returning works in full operation, and I shall as soon as possible accumulate a stock of ore, so that in case of any interruption in the mine we shall not have to suspend returns. The whim at Illingsworth's shaft progresses satisfactorily, and I am very anxious to get it to work to draw the rich ores from Bull's and Thomas's lodes, and to enable the opening out of the latter especially to be continued. With two shafts providing ore, mine dry, and pump-work in order, and some hundreds of thousands of dollars worth of ore accessible, no doubt can be entertained that we shall soon be showing a profit. —Aug. 22: Mine: We have to-day drawn the first skip of ore direct from the 130 fm. level. On Monday, the 24th inst., we shall begin drawing ore regularly, and dry stamping and calcining on the 31st. About Sept. 3 we shall begin amalgamating.—Santa Ana: Sept. 19: I have forwarded to-day to Bogota four ingots of silver, weighing 130 lbs.; Granadian value $3250, being first portion of returns from this establishment for the present month, and realised from ore raised during the month, except about 5 tons, which was on hand from Bull's and Thomas's lodes. I have, moreover, sent to Honda for shipment four boxes of slag bars and cupel bottoms, value $850. Our mining and reduction operations continue without any interruption, save that on the 17th we could only work three barrels, as one became leaky, and had to be changed, which was effected the same day, and we have on hand in amalgam $1000 value.—Marmato Mines for the month of August: Cost, $10,474; returns, $12,261.—Cost and Returns: The returns are somewhat higher than they were in July, but not so favourable as they would have been if mill No. 4 had not been idle during the 4th, 5th, 6th, and 7th of the month (August).—Aguas Claras: Respecting this mine Mr. Treherne writes, under date Sept. 13:—It will be necessary to unite the two months (August and September), inasmuch as during August we could make no returns on account of the work being done to effect the alteration in the machinery. The barrels have been regularly at work since the 28th of last month, and the produce is so far favourable that we confide in being able to pay the cost of the two months by the produce of one nearly. The open workings on the Aguas Claras lode continue to yield favourably.

IMPERIAL SILVER QUARRIES.—Extract from a letter dated Monitor, Alpine co., California, Sept. 21:—If outside indications are to be relied on, we ought to have pay ore in the "Triumph." I visited the famous I X L Mine and other claims in Scandinavian canon some time ago, and came back more pleased with our own location than ever. If, I reason, such ore as is now being run out from I X L upper level is covered by such outcrops, what am I to expect from some of ours? You must remember I by no means look on the Triumph as our best ledge; on the contrary, there are others much more promising, and I could have wished the location inverted; but, as I have already said, its croppings speak well for it, and I look forward with confidence to strike in the Triumph a good ledge.—The Monitor Coal Ledge: I am looking to strike those every day. Yesterday, or rather on Saturday night, I had run 321 ft. of tunnel, making the total length now 501 ft., and according to my calculations and measurements, so far as the means at my command enabled me to make them, I am just 279 ft. from Triumph, and 352 ft. under surface. Taking the running at 13 ft. a week, I shall accomplish this distance on Feb. 22, and, but for Sundays, on Jan. 31. If the ledge dip west, I shall reach it sooner; if east, not so soon.——Sept. 28: Ten feet of tunnel were completed last week.

[For remainder of Foreign Mines, see this day's Journal.]

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